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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/607,786	06/30/2000	Jianfeng Gao	MS1-441US	1171

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EXAMINER	
SPOONER, LAMONT M	

ART UNIT	PAPER NUMBER
2654	

DATE MAILED: 02/28/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/607,786	Applicant(s) GAO ET AL.	
	Examiner Lamont M Spooner	**Art Unit** 2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 22 November 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8-23 and 25-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 8-23 and 25-35* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *30 June 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 11/22/04 has been entered.

2. The proposed claim attached to the Letter Requesting Interview with the Examiner, 11/02/04, will not be entered in as an amendment due to improper format.

Response to Arguments

3. In an Interview with the Applicant's representative, Mark Farrell, January 25, 2005, an agreement was not reached concerning the proposed and amended claims.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ramaswamy et al. (U.S. Patent No. 6,188,976 filed Oct. 23, 1998) in view of Bangalore et al. (U.S. Patent No. 6,317,707 filed Dec. 7,1998).

Ramaswamy et al. and Bangalore et al. are analogous art in that they both deal with language modeling.

As per **claims 1, 18, 19, 20, 27 and 28** Ramaswamy et al. discloses a method comprising:

developing a language model from a tuning set of information (C.2.lines 44-48);

segmenting at least a subset of received textual corpus by clustering every N-items of the received corpus into a training unit, wherein resultant training units are separated by gaps (C.6.line 67, C.7.lines 1, 2-the separate classes inherently includes gaps);

calculating a perplexity value for each segment (C.4.lines 13-20-the external corpus is segmented into linguistic units and a perplexity value is calculated for each unit); and

refining the language model with one or more segments of the received corpus based, at least in part, on the calculated perplexity value for the one or more segments (C.3.lines 47-52, C.4.lines 45-47-the language model is updated based upon the perplexity value).

Ramaswamy et al. does not disclose:

calculating the similarity within a sequence of training chunks on either side of each of the gaps; and

selecting segment boundaries that maximize intra-segment similarity and inter-segment disparity.

However, Bangalore et al. teaches calculating the similarity within a sequence of training chunks (Fig. 2, the space between clusters representing the gaps, C.3.lines 4-12, 15-18, 22, 23-the calculated radius determines the similarity, C.4.lines 8-10-provides the calculation) and selecting segment boundaries that maximize intra-segment similarity and inter-segment disparity (C.3.lines 15, 16-the radius indicates the selected boundaries and compactness maximizes segment similarity and inter-segment disparity, C.4.lines 7-15, the manipulative step of selecting the boundary that maximizes/improves intra-segment similarity and inter-segment disparity is found in selecting "tighter clusters" to occur first in a list, the tighter the cluster defined by the boundary-radius-compactness will improve the intra-segment similarity and simultaneously improve the inter-segment disparity, the ranking involves selecting these maximized/improved clusters based on the boundary/radius/compactness). Therefore, it would have been obvious at the time of the invention to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to provide, by language modeling, (Bangalore C.2.lines 8-15) lexical significancy, and the ability to provide insight of language model to grammar (Bangalore et al. C.2.lines 14, 15), which through the vector representation in a geometrical space and relation to context words (C.2.lines 8-13, 59-67), creates indexed lexically significant clusters (Bangalore et al. C.4.lines 15-17).

As per **claim 2, 21**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 2 depends. Ramaswamy et al. further discloses:

the tuning set of information (C.5.lines 36-38-test corpus) is application specific (C.5.lines 40-44-the application is speech recognition).

As per **claim 3**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 3 depends. Ramaswamy et al. further discloses:

the tuning set of information is comprised of one or more application-specific documents (C.7.lines 6-9,-the application is e-mail, the documents comprise "show me the next e-mail...")

As per **claim 4**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 4 depends. Ramaswamy et al. further discloses:

the tuning set of information is a highly accurate set of textual information linguistically relevant to (C.2.lines 55-58), but not taken from, the received textual corpus (C.3.lines 14-18, the received corpus-external corpus comprises many domains, however the seed corpus is linguistically related, but not taken from the external corpus).

As per **claim 5**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 5 depends. Ramaswamy et al. further discloses:

a training set comprised of at least the subset of the received textual corpus (C.3.lines 6-8,14-17-test corpus is at least the subset of the received textual corpus).

As per **claim 6**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 5, upon which claim 6 depends. Ramaswamy et al. further discloses:

ranking the segments of the training set based, at least in part, on the calculated perplexity value for each segment (C.4.lines 36-41, C.8.lines 34-36).

As per **claim 8**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 8 depends. Ramaswamy et al. further discloses:

the resultant segment defines a training chunk (C.7.lines 14-18-the word class is the chunk that is then used in subsequent processing steps).

As per **claim 9**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 9 depends. Ramaswamy et al. does not disclose:

N is an empirically derived value based, at least in part, on the size of the received corpus.

However, as it is well known in the art, Bangalore et al. teaches having an empirically derived N-vector for each item in the corpus, which thereby is based upon the size of the corpus (C.2.lines 59-65) and every item is included in the vector space (C.3.lines 7,8, Fig 2). Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine

Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to include every item in the clustering process to better improve subsequent clustering results for determining the compactness of a cluster (Bangalore et al. C.2.lines 65, 66, C.3.line 1, C.4.lines 7-14).

As per **claim 10**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 10 depends. Ramaswamy et al. does not disclose:

the calculation of the similarity within a sequence of training units defines a cohesion score.

However, Bangalore et al. teaches the calculation of the similarity within a sequence of training units (C.3.lines 22, 23) defines a cohesion score (C.3.lines 15-19 “very close relationship.” is interpreted as the cohesion). Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to determine how close or similar the training units were to each other for the benefit of maximizing the clustering process of related items (C.4.lines 12, 13).

As per **claim 11**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 10, upon which claim 11 depends. Ramaswamy et al. does not disclose:

intra-segment similarity is measured by the cohesion score.

However, Bangalore et al. teaches intra-segment similarity is measured by the cohesion score (C.3.lines 15-19, 22, 23). Therefore, at the time of the

invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to measure how close or similar the intra-segment training units were to each other for the benefit of maximizing the clustering process of related items (C.3.lines 17-19, C.4.lines 13, 14), to better improve subsequent language modeling results.

As per **claim 12**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 10, upon which claim 12 depends. Ramaswamy et al. does not disclose:

inter-segment disparity is approximated from the cohesion score.

However, Bangalore et al. teaches inter-segment (C.3.lines 24, 25-the different vector coordinates interpreted inter-segments) is approximated form the cohesion score (C.4, lines 35-45, Table 2-the "Compactness Value"-determines the score and cohesion and the "Class Index"-determines the inter-segment disparity resulting from the cohesion score). Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to determine how disparate or distinct the inter-segment training units were to each other for the benefit of maximizing the clustering process of related items (C.3.lines 15-19, C.4.lines 14, 15), to better improve subsequent language modeling results.

As per **claim 13**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 13 depends. Ramaswamy et al. does not disclose:

the calculation of inter-segment disparity defines a depth score.

However, Bangalore et al. teaches the calculation of inter-segment disparity defines a depth score (C.4.lines 12-16, 30-66-Table 2 the depth of the inter-segment disparity approximated form the cohesion score-compactness value- is indicated as the values are “deeper” as they are farther down the list). Therefore, at the time of the invention, it would have been obviousness to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to determine the depth of the disparity in a ranked manner to visually determine the relatedness of different classes or inter-segment disparity by index (C.4.Table 2-visual depth benefit).

As per **claim 14**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 14 depends. Ramaswamy et al. further discloses:

the perplexity value is a measure of the predictive power of a certain language model to a segment of the received corpus (C.4.lines 16-21).

As per **claim 15**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 15 depends. Ramaswamy et al. further discloses:

ranking the segments of at least the subset of the received corpus based, at least in part, on the calculated perplexity value of each segment (C.4.lines 36-40, C.8.lines 34, 35); and

updating the tuning set of information with one or more of the segments from at least the subset of the received corpus (C.4.lines 41-47).

As per **claim 16**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 15, upon which claim 16 depends. Ramaswamy et al. further discloses:

one or more of the segments with the lowest perplexity value from at least the subset of the received corpus are added to the tuning set (C.4.lines 41-47-"...below the perplexity threshold...").

As per **claims 17 and 25**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 1, upon which claim 17 depends. Ramaswamy et al. further discloses:

utilizing the refined language model in an application (C.5.lines 40-42, the application is speech recognition) to predict a likelihood of another corpus (C.5.lines 42-45-the likelihood is interpreted as the "accuracy...for the current language model"-the other corpus is the test corpus).

As per **claim 22**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 20, upon which claim 22 depends. Ramaswamy et al. does not disclose:

the language model agent ranks the segments of the training set based, at least in part, on a measure of similarity between two or more segments.

However, Bangalore et al. teaches ranking the segments of a training set based on a measure of similarity (C.4.lines 9-16, compactness value between segments) between segments. Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to identify by a ranking system the segments of varied similarity measurements in order to maximize the clustering process (C.4.lines 13, 14) to further improve any successive language modeling resulting from using the provided clustering data (C.4.lines 20-29, Table 2).

As per **claim 23**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 22, upon which claim 23 depends. Ramaswamy et al. does not disclose:

the similarity measure is calculated for adjacent segments.

However, Bangalore et al. teaches having a similarity measure calculated for adjacent segments (C.2.lines 29-31, C.2.lines 59-65, C.3.line 1, C.3.lines 15-17). Therefore, at the time of the invention, it would have been obvious to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to obtain similarity measurements of adjacent segments in order to maximize the clustering process to further improve any successive language modeling resulting from using the provided clustering data for the benefit of determining a grammatical model (C.4.lines 15-17, C.5.lines 37-47).

As per **claim 26**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 25, upon which claim 26 depends. Ramaswamy et al. further discloses:

the application is one or more of a spelling and/or grammar checker, a word-processor, a speech recognition application, a language translation application, and the like (C.5.lines 40-42, the application is speech recognition).

As per **claim 29**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 28, upon which claim 29 depends. Ramaswamy et al. further discloses:

the tuning set is dynamically selected as relevant to the received corpus (C.3.lines 47-54).

As per **claim 30**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 28, upon which claim 30 depends. Ramaswamy et al. further discloses:

a dynamic lexicon generation function, to develop an initial lexicon from the tuning set (C.3.lines 42-44-the tuning set (seed corpus) is used to develop an initial lexicon (corpus)), and to update the lexicon with the select segments from the received corpus (C.3.lines 50-55- "...adding linguistic units to relevant corpus"-the relevant corpus being the updated lexicon).

As per **claim 31**, Ramaswamy et al. discloses all of the limitations of claim 28, upon which claim 31 depends. Ramaswamy et al. does not disclose:

a frequency analysis function, to determine a frequency of occurrence of segments within the received corpus.

However, Bangalore et al. teaches having a function based upon frequencies for each input word, which determines the frequencies of segments within the received corpus (C.3.lines 45-47). Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to assist in building a cluster in the well known method of having a vector space to hold the clusters with the frequency of each segment being incorporated into the cluster for the benefit of maximizing the clustering segments (C.3.lines 18-20, 62, 63, C.4.lines 13, 14), to better improve subsequent language modeling results.

As per **claim 32**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 28, upon which claim 32 depends. Ramaswamy et al further discloses:

a dynamic segmentation function (C.5.lines 1-3), to iteratively segment the received corpus (C.5.lines 1-3) to improve a predictive performance attribute of the modeling agent (C.5.lines 6-9-"to improve language model quality..." comprising evaluating perplexity change which is interpreted as the predictive performance).

As per **claim 33**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 32, upon which claim 33 depends. Ramaswamy et al further discloses:

the dynamic segmentation function iteratively re-segments the received corpus until the language model reaches an acceptable threshold (C.5.lines 1,2,

9-15-the external corpus is segmented, iteratively by extracting linguistic units, until the language model is updated once a "...a certain number..." a threshold is reached).

As per **claim 34**, Ramaswamy et al. discloses all of the limitations of claim 32, upon which claim 34 depends. Ramaswamy et al. does not disclose:

a frequency analysis function, to determine a frequency of occurrence of segments within the received corpus.

However, Bangalore et al. teaches having a function based upon frequencies for each input word, which determines the frequencies of segments within the received corpus (C.2.lines 59, 60). Therefore, at the time of the invention, it would have been obvious to one ordinarily skilled in the art to combine Ramaswamy et al. with Bangalore et al. The motivation for doing so would have been to assist in building a cluster in the well known method of having a vector space to hold the clusters with the frequency of each segment being incorporated into the cluster for the benefit of maximizing the clustering segments (C.3.lines 18-20, 62, 63, C.4.lines 13, 14), to better improve subsequent language modeling results.

As per **claim 35**, Ramaswamy et al. and Bangalore et al. disclose all of the limitations of claim 34, upon which claim 35 depends. Ramaswamy et al. further discloses:

the data structure generator removes segments from the data structure that do not meet a minimum frequency threshold (C.4.lines 29-31-it is well known that the relevancy of the segments is based in part on frequency), and

dynamically re-segments the received corpus to improve predictive capability while reducing the size of the data structure (C.5.lines 1-3, C.5.lines 6-9-"to improve language model quality…" comprising evaluating perplexity change which is interpreted as the predictive performance).

Conclusion

6. This is a continuation of applicant's earlier Application No. 09/607,786. All claims are drawn to the same invention claimed in the earlier application and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the earlier application. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action in this case. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no, however, event will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lamont M Spooner whose telephone number is 703/305-8661. The examiner can normally be reached on 8:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on 703/305-9645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

lms
02/15/2005

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